



National Aeronautics and Space Administration  
Goddard Space Flight Center

Wallops Flight Facility, Wallops Island, Virginia

# Inside Wallops

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## ***New Boomerang Findings Reveal “Music” Of The Early Universe***

An international team of cosmologists has begun to hear the “music of creation” in its discovery of acoustic “notes” in the sound waves that rippled through the universe not long after the Big Bang.

The new results — from a detailed analysis of high-resolution images obtained by the BOOMERANG (Balloon Observations of Millimetric Extragalactic Radiation and Geophysics) experiment — provide the most precise measurement to date of several of the key characteristics which cosmologists use to describe the universe.

BOOMERANG is an extremely sensitive microwave telescope suspended from a NASA scientific balloon that circumnavigated the Antarctic in late 1998. The balloon carried the telescope at an altitude of almost 37 kilometers (120,000 feet) for 10 1/2 days. A detailed analysis of these maps provided the new results, which were presented Sunday, April 29, at the American Physical Society Spring Meeting in Washington, DC.

Wallops Flight Facility manages the Scientific Balloon Program for NASA

“The early universe is full of sound waves compressing and rarefying matter and light, much like sound waves compress and rarefy air inside a flute or trumpet,” said Italian team leader Paolo deBernardis. “For the first time the new data show clearly the harmonics of these waves.”

The cosmic microwave background (CMB) was first discovered by a ground-based radio telescope in 1965. Within a few years, Russian and American theorists had independently predicted that the size and amplitude of structures that developed in the early universe would form what mathematicians call a “harmonic series” of structure imprinted on the CMB. In 1991, NASA’s Cosmic Background Explorer satellite (COBE) discovered the first evidence for structure of any sort in the CMB.

The BOOMERANG images are the first to bring the cosmic microwave background into sharp focus. The images reveal hundreds of complex regions visible as tiny variations — typically only 100 millionths of a degree — in the temperature of the

CMB. The new results show the first evidence for a harmonic series of angular scales on which structure is most pronounced. The presence of these harmonic peaks bolsters the theory that the universe grew from a tiny subatomic region during a period of violent expansion a split second after the Big Bang.

“Just as the difference in harmonic content allows us to distinguish between a flute or trumpet playing the same note, so the details of the harmonic content imprinted in the CMB allow us to understand the



*The BOOMERANG telescope being readied for launch.*

detailed nature of the universe,” said lead author Barth Netterfield, of the University of Toronto in Canada.

The images obtained cover about three percent of the sky. The BOOMERANG team plans another campaign to the Antarctic in the near future, this time to map even fainter images encoded in the polarization of the cosmic microwave background.

The 36 team members come from 16 universities and organizations in Canada, Italy, the United Kingdom and the United States.

Primary support for the BOOMERANG project comes from NASA and the National Science Foundation in the United States; the Italian Space Agency, Italian Antarctic Research Programme, and the University of Rome “La Sapienza” in Italy; and from the Particle Physics and Astronomy Research Council in the United Kingdom.

More information on the NASA Scientific Balloon Program can be found at <http://www.wff.nasa.gov/pages/sicentificballoons.html>

For information and images from BOOMERANG, see: <http://www.physics.ucsb.edu/~boomerang/>

## ***Wallops Shorts..... Rocket Launch***

A NASA Orion sounding rocket was successfully launched from Wallops Island, April 27. The University of Virginia student payload was to give the students an opportunity to learn the development, construction, testing, deployment and data processing elements involved with conducting a science mission. Professor Gabriel Laufer was the principal investigator. The payload was recovered and returned to the students.

## ***School Visits***

Charlie Lipsett and Chuck Brodell, Shuttle Small Payloads Projects Office, visited Bever Run Elementary School and also met with students from five schools in the Anne Arundel County Carver Center on April 24. Student Experiment Modules that flew on Space Shuttle STS 102 were returned to each group.

## ***UMES Tech Expo***

Keith Koehler, Public Affairs Office, participated in the University of Maryland, Eastern Shore Tech Expo held April 26.

## ***Career Fair***

Steve Kremer, Flight Projects Directorate, took part in a Career Fair at Southern Garrett High School on April 27.

## ***Brown Bag Lunch***

Due to a scheduling conflict, the employee brown bag lunch with Wallops management has been rescheduled from May 2 to May 9. It will be from 11:30 to 12:30 in the Williamsburg Room, Building E-2, and is open to all Wallops employees.

## ***Space Day 2001***

Now in its fifth year, Space Day, is a global celebration of the extraordinary achievements, benefits and opportunities found in space exploration. People around the world will come together to advance education in science, math and technology to inspire children to realize the vision of our space pioneers.

Space Day 2001, May 3, will be celebrated with Senator John Glenn as Co-chair of the Space Day International Advisory Board. A live, interactive Cyber Space Day Webcast will be broadcast via satellite and on the Internet at: <http://www.spaceday.com>

Notes from the Gardner  
Growing Vine Crops

Whether it's a jack-o'lantern, water-melon or ornamental gourds, everyone loves some kind of vine crop.



Cucumbers and summer squash are the first to ripen, letting us know that summer has arrived.

Some cucumbers and squash are ready to pick within 48 to 62 days of planting, allowing plenty of time for a second planting. Shortly after the summer squash harvest begins, sweet melons are ready for picking.

Early winter squash usually ripen at about the same time. Other kinds of winter squash are ready for harvest as fall approaches at about the same time as pumpkins and gourds.



Give plants a bed in full sun with rich soil and consistent moisture to ensure a good crop. Sow seed or transplant seedlings now. Spread a heaping

shovel full of compost or a cup of 10-10-10 for every five feet of row or per hill. Cover the fertilizer with two to three inches of soil.

Once the vines are growing, make sure they get about an inch of water each week. This is important for taste. The fruit can become bitter or bland if stressed by dry conditions or lack of nutrients.

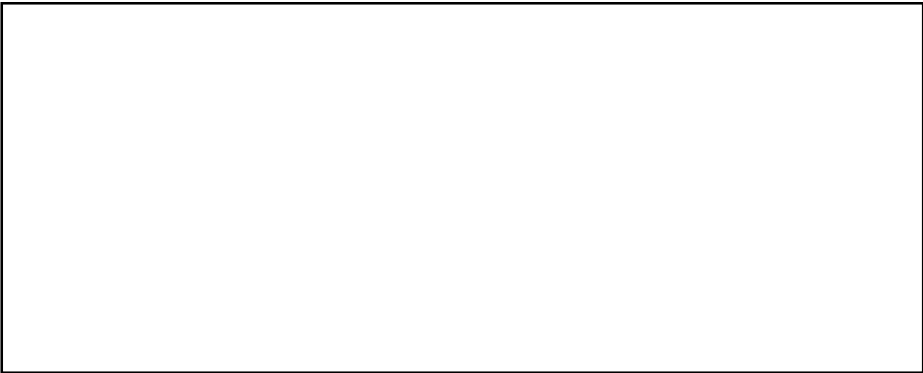
Trellising vines helps them catch more sun, saves space, keeps the fruit off the ground and the improved air circulation reduces the chance of disease. A trellis is especially helpful if you garden in containers. Make fabric slings for larger fruit.

Pollination is the key to success, so invite pollinating insects to your garden. They'll flock to fragrant and colorful flowers such as alyssum, chives and dill and stop by your vines on the way.

National Day of Prayer  
Noon  
May 3  
At the Flag Court  
Speaker: Barry McCready

Annual Health Fair

The NASA Wallops Annual Health Fair will be held May 3 from 10:30 a.m. to 1:30 p.m. in Building D-10. All civil service and contract employees are welcome. For more information contact the Health Unit, x1266.



Steak Dinner

May 11  
6:30 to 8:30 p.m.  
Building F-3

Menu: Steak (grilled to order)  
Tossed Salad  
Baked Potato  
Corn on the Cob  
Bread  
Dessert  
Beverage



Tickets are \$15 per person and are available from Sandy Gunter, x1454, in Building F-3 and the WEMA Exchange Store, x2020, in Building E-2.

Retirement Planning  
Workshop  
May 22 - 24, 2001  
9 a.m. - 4:30 p.m.  
Building E-104 - Room 310

This workshop is for CS or FERS Federal employees who are 3-5 years from retirement or retirement eligible and their spouses.

The seminar provides exposure to experts in each of the following topics.  
Social Security Implications  
Thrift Saving Plans  
Insurance Needs, Benefits and Options  
Lifetime Fitness and Health  
Financial Planning and Estate Planning

Training requests are required. To ensure you get into the course, fax an advanced copy to Kathy Dinsmore on x 66-1679.



PAO Digital Photos  
Programming Robotics was a hit with those attending the April 26, "Take Your Daughter to Work Day", activities. Jay Pittman, Real-Time Software Engineering Branch, helps program a robot's sensors and motions to solve engineering problems. Almost 100 children took part in the event hosted by the Federal Women's Program of NASA, Navy and NOAA. Building and launching bottle rockets, bottom left, was another popular activity.



The Library Corner  
by Sam Hall, Library Technician

- Did you know.....
- that you can get a current listing of all Colloquia by going to the Library's home page at: <http://library.gsfc.nasa.gov>, clicking on resources, then colloquium?
  - that the Balloon Technology Library database has moved? It can now be found, on the Library home page, click on: Search this Site, then check: Balloon Technology and uncheck everything else. When the page comes up, use either title, subject or author to search the database. When the hits appear, there will be two different kinds. Files starting with an Access No. are brief records and only available in the Library. Files that start with a BT-# are PDF files available on-line.

- that ENGnetBASE is a database allowing access to 30 CRC Handbooks. There are currently over 33,000 pages with over 1,800 articles written by 2,200 experts. These are available at: <http://www.engnetbase.com> and on the Library home page, by clicking on Books and then clicking on More CRC Handbooks.

- that the Library now subscribes to Space Illustrated magazine?

Wanted  
Housemate, call (757) 824-6185 evenings.



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